

connected to the top plate somewhere within the top plate's interior area;

a power amplifier; and

a transmission line connecting the feed pin to the power amplifier.

REMARKS

We have replaced the paragraph starting on line 15 of page 8 to correct clerical errors.

In paragraph 1 of the Detailed Action the Examiner has objected to the drawings under 37 CFR 1.83(a) because all of the features found in claims 3-5, 16-17, 22, 25-27, 34-35 and 39 were not shown in the drawings. Specifically the power amplifier recited in the above-mentioned claims was not shown. Figures 1A and 3B have been amended to include a symbol denoting a Power Amplifier (PA) 70. The PA 70 is new to the Figures 1A and 3B but is supported by the specification as are the claims reciting the power amplifier and features thereof. Similarly, a PA 700 has been added to Figure 4B. Again, the PA 700 is new to Figure 4B, but this amendment is supported in the specification just as the amendments to Figure 1A and 3B are. The Examiner is respectfully requested to reconsider and withdraw this objection to the drawings.

Formal drawings including the amendments will be filed on allowance, assuming the Examiner authorizes the amendments.

In paragraph 2 of the Detailed Action the Examiner has objected to the drawings under 37CFR 1.84(p)(5) because they include reference numeral "60" and "600" not mentioned in the description. The specification has been amended to include reference to these numerals. Also, Figure 3B has been amended to include reference numeral "60" in the same place it is found in Figure 1A. In fact the specification as currently on file in regard to this amendment, already references "terminal 60" in Figure 3B although "terminal 60" was not originally marked in Figure 3B. The Examiner is respectfully requested to reconsider and withdraw this objection to

the drawing.

In paragraph 3 of the Detailed Action the Examiner has objected to claim 3 because it incorrectly references claim 1 in place of correctly referencing claim 2. Claim 3 has been amended to overcome this informal defect. Accordingly, the Examiner is respectfully requested to reconsider and withdraw this informal objection to claim 3.

In paragraph 4 of the Detail Action the Examiner has objected to claim 39 because of a typographical error. Applicant has amended the phrase "An offset top loaded monopole" to "an offset top loaded monopole. The Examiner is respectfully requested to reconsider and withdraw this informal objection to claim 39.

In paragraph 5 of the Detailed Action the Examiner has advised that he believes that claims 25 and 27 are substantially duplicated by claims 34 and 35 respectively. Applicant has cancelled claims 34 and 35.

Similarly in paragraph 6 of the Detailed Action the Examiner has advised that he believes that claim 3 is substantially duplicated by claim 16. Applicant has cancelled claims 16 and 17.

35 U.S.C. 102(e) Rejections

In paragraph 8 of the Detailed Action the Examiner has rejected claims 1, 4-5, 7, 9, 15, 22-23, 26-28, 33 and 39 under 35 U.S.C. 102(e) as being anticipated by Saito (U.S. Patent No. 6, 255, 994). The Applicant respectfully disagrees.

Regarding claim 1, the Examiner states that Saito teaches (in Figures 4-10) a planar inverted F-antenna PIFA having "...a dielectric material [14, air], a feed pin [4] connected to the top plate [4], a first shorting pin [5] and a second shorting pin [6], the first and second shorting pins [5,6] connecting the top plate [2] to the ground plane [3]...". The applicant respectfully disagrees with the Examiner.

First, the items [4,5,6] that the Examiner equates to the feed pin and the first and second shorting pins are not taught to be pins by Saito. Saito teaches that these items [4,5,6] are plate-like terminals in: Col. 1, lines 55-56 in relation to Figure 1 (which is Saito's own prior art); and Col. 7 lines 11-45 in relation to Figure 4. Specifically, the terminals [102,103,104] (in Figure 1) and terminals [4,5,6] (in Figures 4-10) are taught to be extensions of the conducting plate to which they are attached. Furthermore, it is clear from Figures 1 and 4-10 that the terminals [4,5,6] are in fact plate-like and not pins.

Second, the placement of terminals [4,5,6] is specified to be "connected to one of the short-sides of the rectangular element 2. (Col. 7, lines 16-17 and Figure 4)". By contrast the embodiments of the present invention as described in the specification specifically recite that the feed pin and shorting pins are connected within the top plate's interior area. This limitation is specified in claim 21 which was allowed by the Examiner. Accordingly, in order to clarify claim 1 the applicant has amended claim 1 to include the limitations that the feed pin and the shorting pins are within the interior area of the top plate. Applicant believes that claim 1 as now amended distinguishes patentably over Saito since Saito specifically teaches that the plate-like terminals [4,5,6] must be connected to a short side of the rectangular element 2. This is an important distinction because the specification discloses on page 16 that "[a]ny symmetric top plate defined by at least one of symmetry across its broadest surface could be used in place of the rectangular top plate..." which is used as the radiating element in the present invention. Applicant believes that claim 1 as amended clearly covers this idea whereas claim 21, which specifies a rectangular top-plate does not.

The Examiner is requested to reconsider and withdraw his 35 U.S.C. 102(e) rejection of claim 1. The Applicant also respectfully requests the Examiner to reconsider and withdraw his 35 U.S.C. 102(e) rejection of claims 4-5, 7, 9 and 15 as they are dependent upon the newly amended claim 1 which the Applicant believes distinguishes patentably over Saito.

Claim 22 has been amended in a similar manner to that of claim 1 to include the limitations that specify that the feed pin and first and second shorting pins are connected to the

top-plate within the top plate's interior area. Again, Applicant believes that this limitation distinguishes the present invention from Saito. Thus the Applicant respectfully requests the Examiner to reconsider and withdraw his 35 U.S.C. 102(e) rejection of claim 22.

In regard to the Examiner's 35 U.S.C. 102(e) rejection of claims 23, 26-28, 33 and 39 which are claims to "an offset top loaded monopole", the Applicant respectfully disagrees. Saito does not disclose a top-loaded monopole. Saito does disclose a PIFA as described previously. However, Applicant has amended claims 23, 33 and 39 to include the limitation that the feed pin is connected to the top-plate's interior area to clarify the claims and ensure that the claims clearly distinguish patentably from Saito. Claims 26-28 are dependent on newly amended claim 23. Thus the Applicant respectfully requests the Examiner to reconsider and withdraw his 35 U.S.C. 102(e) rejection of claims 23, 26-28, 33 and 39.

In paragraph 9 of the Detailed Action the Examiner has rejected claims 1, 10, 23, 29 and 38 under 35 U.S.C. 102(e) as being anticipated by Saito. As detailed above, Applicant believes that the newly amended claims 1 and 23 distinguish patentably from Saito. Moreover, claims 10 and 29 which are dependent on claims 1 and 23 respectively must as well. Thus the Applicant respectfully requests the Examiner to reconsider and withdraw his 35 U.S.C. 102(e) rejection of claims 1, 10, 23 and 29.

With respect to claim 38, Applicant notes that this claim as presently on file includes the distinguishing limitation of having the feed pin connected to the top plate somewhere within the top plate's interior area. Accordingly, the Applicant believes that claim 38 distinguishes patentably from Saito. However, for the purposes of clarity the term "of the top plate" has been removed from the claim. This was also done in allowed claim 21. Thus the Applicant respectfully requests the Examiner to reconsider and withdraw his 35 U.S.C. 102(e) rejection of claim 38.

35 U.S.C. 103(a) Rejections

In paragraph 11 of the Detailed Action the Examiner has rejected claims 2-3 and

24-25 under 35 U.S.C. 103(a) as being unpatentable over Saito in view of Papatheodorou (U.S. Patent No. 6, 072, 434). The Examiner states that Saito teaches *every* feature of the claimed invention except for the transmission line being used for further fine-tuning of the PIFA or TLM. The Applicant respectfully disagrees that Saito teaches every feature of the claimed invention except for the transmission line being used for further fine-tuning of the PIFA or TLM. The Applicant believes that in reference to the above arguments and amendments to claims 1 and 23 (on which the claims currently in question are respectively dependent upon) have been shown to distinguish patentably over Saito in that Saito does not teach every feature of claim 1 or 23. Accordingly, Saito can not be combined with Papatheodorou to produce the present invention. Thus the Applicant respectfully requests that the Examiner reconsider and withdraw his 35 U.S.C 103(a) rejection of claims 2-3 and 24-25.

In paragraph 12 of the Detailed Action the Examiner has rejected claims 11-13 and 30-32 under 35 U.S.C. 103(a) as being unpatentable over Saito. Similar to the claims in the preceding paragraph, these claims are dependent upon claims that have been distinguished patentably from what is taught in Saito. Accordingly these claims would not be obvious since not all of the features of the independent claims are taught by Saito. Thus the Applicant respectfully requests that the Examiner reconsider and withdraw his 35 U.S.C 103(a) rejection of claims 11-13 and 30-32.

Allowed Claims & Subject Matter

The Applicant appreciatively acknowledges that the Examiner has allowed claims 18-21 and 36-37 in paragraph 13 of the Detailed Action.

In paragraph 14 of the Detail Action the Examiner has objected to claim 6, 8 and 14 as being dependent on a rejected base claim, but has also stated that these claims if re-written in independent form would be allowable. Applicant appreciatively acknowledges the Examiner's recognition that the subject matter of these claims is allowable, but the Applicant believes that all of the claims as now amended distinguish patentably over the cited art.

Attached hereto is a version showing the changes made to the description and claims by the current amendment. The attachment is captioned "Version with Markings to Show Changes Made".

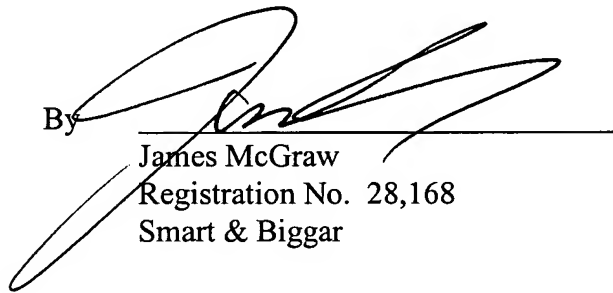
For all of the foregoing, Applicant respectfully requests allowance.

If any objections remain, the Examiner is respectfully requested to telephone the undersigned with a view to resolving such objections as expeditiously as possible.

Respectfully submitted,

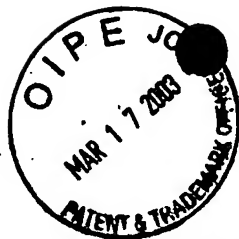
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Version with Markings to Show Changes Made

IN THE DESCRIPTION

Paragraph starting at line 15 of page 8:

-- A feed pin 20 is connected to the underside of the top plate 10. A first shorting pin 21 and a second shorting pin 22 (not shown in Figure 1a) are connected between the underside of the top plate 10 and the ground plane 11, such that an imaginary line between the feed pin 20 and shorting pins 21 and 22 forms a right angle whose sides are parallel to two respective sides of the top plate 10. In Figure 1b it can be seen that the shorting pins, 21 and 22, are a distance $[\rho_1]$ ρ_2 and $[\rho_2]$ ρ_1 from the feed pin 20. Preferably the distances $[\rho_1]$ ρ_2 and $[\rho_2]$ ρ_1 are equal.--

Paragraph starting on line 25 of page 8:

-- Feed pin 20 is connected between the top plate 10 and a first end of a short length of transmission line 30 having characteristic impedance Z_0 and length 1. The transmission line 30 has a second end coupled to a power amplifier (PA) 70 at terminal 60. Transmission line 30 is used to fine-tune the input impedance of the radiating element for class-F and inverse class-F operation.--

Paragraph starting on line 31 of page 15:

-- Figures 4a and 4b illustrate the top view and side view of the offset TLM optimized to operate at 2.2GHz respectively. A top plate 100 is placed at a height h over a ground plane. The dimensions of the to plate are 55.88 mm x 55.88 mm, and the required length of transmission line used to fine tune the offset-TLM is 25 mm. There are no shorting pins and only a single feed pin 200. The feed pin 200 is connected between the top plate 100 and a first end of a short length of transmission line 300, similar to the transmission line 30 shown in Figures 1A and 3B. The transmission line 300 has a second end coupled to a power amplifier (PA) 700 at terminal 600. The lack of the shorting pins causes significant increases in the area

of the top plate and length of the transmission line 300, as compared to the area and length required for a PIFA having two shorting pins and a feed pin. Note that the input impedance to this radiating element is approximately that of an inverse class-F impedance.--

IN THE CLAIMS:

Claim 1 (Amended) A Planar inverted-F Antenna (PIFA) comprising:

a top plate, a ground plate, a dielectric material between the top plate and the ground plane, and a feed pin connected to the top plate somewhere within the top plate's interior area;

a first shorting pin and a second shorting pin, the first and second shorting pins directly connecting to the top plate somewhere within the top plate's interior area and to the ground plane, and [being] the first and second shorting pins located at distances ρ_1 and ρ_2 , respectively, from the feed pin to provide a desired impedance of the PIFA at the feed pin.

Claim 2 (Amended) The PIFA of claim 1, wherein the feed pin is connected to a first end of a transmission line, the transmission line being used for fine-tuning of the PIFA.

Claim 3 (Amended) The PIFA of claim [1] 2, wherein [the] a second end of the transmission line is connected to a power amplifier.

Claim 21 (Amended) A planar inverted-F antenna (PIFA) comprising of:

a rectangular top-plate, having a dimension L and a dimension W, a ground plane having dimensions larger than those of the top-plate, and a dielectric material between the top-plate and ground plate;

a feed pin connected to the top-plate somewhere within the top-plate's interior area [of the top-plate];

a first shorting pin and a second shorting pin connected between, and to, the top-plate and ground plane, such that the feed pin and two shorting pins form substantially a right

angle whose edges are substantially perpendicular and parallel to an edge of the top-plate, and such that each shorting pin is a distance ρ from the feed pin; and

a length of transmission line connected to the end of the feed pin that is not connected to the top-plate.

Claim 22 (Amended) A communication device comprising:

a planar inverted-F antenna (PIFA) having a top plate, a ground plane, and a feed pin connected to the top plate somewhere within the top plate's interior area, a first shorting pin and a second shorting pin, the first and second pins connecting to the top plate somewhere within the top plate's interior area and to the ground plate;

a power amplifier; and

a transmission line connecting the feed pin to the power amplifier.

Claim 23 (Amended) An offset top loaded monopole (TLM) comprising:

a top plate, a ground plane, a dielectric material between the top plate and the ground plane and a feed pin connected to the top plate substantially offset from the centre of the top plate somewhere within the top plate's interior area to provide a desired impedance of the offset TLM at the feed pin.

Claim 38 (Amended) An offset top loaded monopole (TLM) comprising of:

A rectangular top-plate, having a dimension L and a dimension W, a ground plane having dimensions larger than those of the top-plate, and a dielectric material sandwiched between the top-plate and ground plane;

a feed pin connected to the top-plate somewhere within the top-plate's interior area [of the top-plate];

a length of transmission line connected to the end of the feed pin that is not

connected to the top-plate.

Claim 39 (Amended) A communication device comprising:

[A]an offset top loaded monopole having a top plate, a ground plane, and a feed pin connected to the top plate somewhere within the top plate's interior area;

a power amplifier; and

a transmission line connecting the feed pin to the power amplifier.